REMARKS

INTRODUCTION:

In accordance with the foregoing, claims 1, 3, 4 and 9 have been amended, and claims 2 and 10 have been cancelled without prejudice or disclaimer. Approval and entry are respectfully requested.

Claims 1 and 3-9 are pending and under consideration. Reconsideration is respectfully requested.

ENTRY OF RESPONSE UNDER 37 C.F.R. §1.116:

Applicants request entry of this Rule 116 Response and Request for Reconsideration because:

(a) at least certain of the rejected claims have been canceled, thereby at least reducing the issues for appeal;

(b) it is believed that the amendments of claims 1, 3, 4 and 9 and cancellation of claims 2 and 10 put this application into condition for allowance;

(c) the amendments were not earlier presented because the Applicants believed in good faith that the cited prior art did not disclose the present invention as previously claimed;

(d) the amendments of claims 1, 3, 4 and 9 should not entail any further search by the Examiner since no new features are being added or no new issues are being raised; and/or

(e) the amendments do not significantly alter the scope of the claims and place the application at least into a better form for appeal. No new features or new issues are being raised.

The Manual of Patent Examining Procedures sets forth in §714.12 that "[a]ny amendment that would place the case either in condition for allowance <u>or in better form for appeal</u> may be entered." (Underlining added for emphasis) Moreover, §714.13 sets forth that "[t]he Proposed Amendment should be given sufficient consideration to determine whether the claims are in condition for allowance and/or whether the issues on appeal are simplified." The Manual of Patent Examining Procedures further articulates that the reason for any non-entry should be explained expressly in the Advisory Action.

AMENDMENT OF CLAIMS:

Independent claims 1 and 9 have been amended to show more clearly that the present invention utilizes Raman amplification to provide an improved communication system (see, e.g., paragraphs [0009]-[0013] and [0028]-[0039] of the publication of the specification). Claims 3 and

4 have been amended to update the dependency. Claims 2 and 10 have been cancelled without prejudice or disclaimer.

REJECTION UNDER 35 U.S.C. §103:

In the Office Action, at pages 2-4, numbered paragraph 2, claims 1-10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sugiyama (USPN 5,883,735; hereafter, Sugiyama) in view of Terahara (USPN 6,647,211; hereafter, Terahara). The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed and reconsideration is requested.

The supervisory signal sending control means of amended claims 1 and 9 describes setting a transmission rate of the drive supervisory signal to a minimized value (which is referred to in lines 11-20 of page 7 of the specification as a value selected so that even when a DRA is not operating, the bit rate of the OSC2 will not fall below the minimum receiving level on the receiving side) and sending the drive supervisory signal so that the drive supervisory signal can be received in a state in which the Raman optical fiber amplifier is not operating; and a bit rate B_{OSC2} of the drive supervisory signal is given by $B_{OSC2}=B_{OSC1}/10$^($G_{DRA@OSC1}/10$) where 10^A $=10^A$, wherein B_{OSC1} is a bit rate of the supervisory signal and $G_{DRA@OSC1}$ is a gain of the Raman amplifier for the supervisory signal.

Sugiyama and/or Terahara fail to disclose or teach the function of the supervisory signal sending control means as set forth in amended claims 1 and 9 of the present invention.

The following brief discussion of the development of Raman amplification is provided to emphasize how the present invention differs from traditional communication systems. A traditional configuration of a wavelength division multiplex (WDM) system generally utilizes a number of optical transmitters, an optical multiplexer, spans of optical transmission fiber, such as a single-mode fiber (SSMF), optical amplifiers, usually erbium-doped fiber amplifiers (EDFAs), dispersion compensating devices like spans of dispersion compensating fiber (DCF) or chirped fiber Bragg gratings (FBGs), an optical demultiplexer, and a number of optical receivers. See, e.g., Sugiyama at col. 4, lines 39-44.

On the other hand, a Raman amplifier uses the intrinsic properties of silica fibers to obtain signal amplification. This means that transmission fibers can be used as a medium for amplification, and hence, that the intrinsic attenuation of data signals transmitted over the fiber can be combated within the fiber. An amplifier working on the basis of this principle is generally known as a distributed Raman amplifier (DRA).

The physical property behind DRAs is called stimulated Raman scattering (SRS). SRS occurs when a sufficiently large pump wave is co-launched at a lower wavelength than the signal

to be amplified. The Raman gain depends directly on the pump power and the frequency offset between the pump and the signal. Amplification occurs when the pump photon gives up its energy to create a new photon at the signal wavelength, plus some residual energy, which is absorbed as phonons (vibrational energy).

Since there is a wide range of vibrational states above the ground state, a broad range of possible transitions is providing gain. Generally, Raman gain increases almost linearly with wavelength offset between signal and pump, peaking at about 100 nm and then drops rapidly with increased offset. The usable bandwidth is about 48 nm.

The position of the gain bandwidth within the wavelength domain can be adjusted by tuning the pump wavelength. Thus, Raman amplification potentially can be achieved in every region of the transmission window of the optical transmission fiber. It only depends on the availability of powerful pump sources at the required wavelengths.

To partially compensate fiber attenuation using the Raman effect, and thus, to increase the EDFA spacing, the Raman pump wave can be conveniently placed at the EDFA locations. This saves costs as less EDFAs are needed on the link, and the number of sites to be maintained is reduced.

In addition, hybrid EDFA/Raman amplifiers are characterized by a flat gain over especially large bandwidths. Repeaters may be built that compensate for the non-flatness of the EDFA gain with a more flexible Raman gain. Multi-wavelength pumping may be used to shape the Raman gain such that it equalizes for the EDFA gain shaping.

Also, the Raman effect on its own may be used for signal amplification in transmission windows that cannot be covered properly by EDFAs. Some frequency regions of a wideband WDM signal may be amplified by common EDFA structures, while others are amplified using the Raman effect and appropriate pumping.

Raman amplifiers offer advantages such as: low noise buildup, simple design (no special transmission medium is needed), flexible assignment of signal frequencies since Raman gain depends on the pump wavelength and not on a wavelength-sensitive material parameter of the medium, such as the emission cross-section of dopant in the EDF, and achievable broad gain bandwidth obtained by combining the Raman amplification effect of several pump waves that are placed carefully in the wavelength domain.

The present claimed invention utilizes Raman amplification to provide a communication system that improves operation and maintenance and control communication efficiently, as noted, e.g., in paragraphs [0009]-[0013] and [0028]-[0039] of the publication of the specification.

Sugiyama discloses a communication system using erbium-doped fiber (see col. 4, lines 39-42), but does not disclose or teach the use of Raman amplification. Terahara discloses a conventional wave-division multiplexed transmission system in which an optical transmit terminal, which acts as a first light signal transmit/receive terminal, and an optical receive terminal, which acts as a second light signal transmit/receive terminal, are connected through optical fibers, and an active equalizer is further interpolated between the optical transmit terminal and the optical receive terminal. However, Terahara does not relate to the use of Raman amplification.

Thus, it is respectfully submitted that amended claims 1 and 9 are patentable under 35 U.S.C. §103(a) over Sugiyama (USPN 5,883,735) in view of Terahara (USPN 6,647,211). Since claims 3-8 depend from amended claim 1, claims 3-8 are submitted to be patentable under 35 U.S.C. §103(a) over Sugiyama (USPN 5,883,735) in view of Terahara (USPN 6,647,211) for at least the reasons that amended claim 1 is submitted to be patentable under 35 U.S.C. §103(a) over Sugiyama (USPN 5,883,735) in view of Terahara (USPN 6,647,211).

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited. At a minimum, this Amendment should be entered at least for purposes of Appeal as it either clarifies and/or narrows the issues for consideration by the Board.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited and possibly concluded by the Examiner contacting the undersigned attorney for a telephone interview to discuss any such remaining issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: October 14, 2005

By: Darleen Stockley
Darleen J. Stockley
Registration No. 34,257

1201 New York Avenue, NW, Suite 700
Washington, D.C. 20005
Telephone: (202) 434-1500
Facsimile: (202) 434-1501